Wednesday, 28/05/2008 9:58:05 AM Julie Lecocq User: : CU-DAR001 Dart Helicopters Services **Customer** : 39535 Job Number : 12816 **Estimate Number** P.O. Number : 28/05/2008 S.O. No. : This Issue : NC Prsht Rev. : // -Type First Issue **^39534 Previous Run** Written By Checked & Approved By : Est Rev:A Comment **Additional Product** 

**Process Sheet** 

**Drawing Name** 

: 412 X-TUBE INST, LOW NARROW FWD

Part Number

: D412664105

**Drawing Number** 

D412-664-145 REV C

Project Number

: N/A

**Drawing Revision** 

: C

Material

Due Date

: 02/06/2008

Qty:

1 Um:

Each

: CROSSTUBES

New Issue 07-04-05 JLM

Job Number:



**Machine Or Operation:** Seq. #:

Description:

1.0 DC

DOCUMENT CONTROL



Comment: DOCUMENT CONTROL

Photocopy bluefile and create labels as per

2.0



PACKAGING RESOURCE #1



Comment: PACKAGING RESOURCE #1

D412664105TRN 3.0

Comment: Qty.:

CROSSTUBE TURNING DETAIL



1.0000 Each(s)/Unit Total: 1.0000 Each(s)

CROSSTUBE TURNING DETAIL

batch 338013



4.0

BENDING

**BENDING MACHINE - SKIDTUBES** 



**Comment: BENDING MACHINE** 

Bend tube as per Dwg D412-664-145 using CNC bender program





5.0

6.0

2006 QUS



Comment: DIMENSIONAL



**CROSSTUBES RESOURCE 1** 

er namen productive policy and a productive productive and the second



Comment: LANDING GEAR RESOURCE 1

1-Drill pilot holes in tube as per Dwg D412-664-245

2-Ream hole to finish size in tube as per Dwg D412-664-245

W/O:		WORK ORDER CHA	NGES				
DATE	STEP	PROCEDURE CHANGE	Ву	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector
		~					
Part No	:	PAR #: Fault Category:	NCR: Yes	No DQ	<b>A</b> :	Date: _	
			QA:	N/C Close	d:	_ Date: _	
		WORK ORDER NON CONFOR	MAANOE INO	<b>D</b> \			

NCR: WORK ORDER NON-CONFORMANCE (NCR)								
		Description of NC		Corrective Action Section B		Verification	Approval	Approval
DATE	STEP	Section A	Initial Chief Eng	Action Description Chief Eng	Sign & Date	Section C	Chief Eng	QC Inspector
						;		
					1			

Wednesday, 28/05/2008 9:58:05 AM Date: User: Julie Lecocq **Process Sheet** Drawing Name: 412 X-TUBE INST, LOW NARROW FWD Customer: CU-DAR001 Dart Helicopters Services **Part Number:** D412664105 Job Number: 39535 Job Number: Description: Seq. #: **Machine Or Operation:** 3-Deburr & Inspect for surface damage. Repair damage within limits as per Dwg D412-664-245 TE 08:05-29 HAND FINISHING RESOURCE #1 HAND FINISHING1 7.0 Comment: HAND FINISHING RESOURCE #1 Chemical Conversion Coat Tube as per QSI 005 4.1 INSPECT POWDER COAT/CHEMICAL CONVERSION 8.0 QC3 Comment: INSPECT POWDER COAT/CHEMICAL CONVERSION INSPECT WORK TO CURRENT STEP 9.0 QC5 Comment: INSPECT WORK TO CURRENT STEP **OUTSIDE SERV.10 OUTSIDE SERVICES -skids** 10.0 Comment: Sub-Contracting OUTSIDE SERVICES Liquid Penetrant Inspection as per QSI 038Or 1. Log106102 0 Issue P/O: 6 471 LPI as per ASTM 1417 Level 2 Attach copy of NDT results to work order PACKAGING RESOURCE #1 PACKAGING 1 11.0 Comment: PACKAGING RESOURCE #1 Inspect for transit damage Ensure copy of NDT results attached to work order. INSPECT WORK TO CURRENT STEP 12.0 QC5 Comment: Inspect for damage & ensure results are as per Dwg D412-664-203 SPRAY PAINTING 13.0 **Comment: SPRAY PAINTING** 1-Prime inside and outside crosstube as per QSI 005 4.2 08 06 2-Paint outside crosstube with White Imron as per QSI 005 4.2

W/O:		WORK ORDER CHA	NGES	·			
DATE	STEP	PROCEDURE CHANGE	Ву	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector
Part No	:	PAR #: Fault Category:	NCR: Yes	No <b>DQ</b>	\:	_ Date: _	

QA: N/C Closed: \_\_\_\_ Date: \_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)									
		Description of NC		Corrective Action Section B			A				
DATE	STEP	Section A	Initial Chief Eng	Action Description Chief Eng	Sign & Date	Verification Section C	Approval Chief Eng	Approval QC Inspector			
						•					
						:					

Wednesday, 28/05/2008 9:58:05 AM Date: User: Julie Lecoca **Process Sheet** Drawing Name: 412 X-TUBE INST, LOW NARROW FWD Customer: CU-DAR001 Dart Helicopters Services Job Number: 39535 Part Number: D412664105 Job Number: Seq. #: Description: Machine Or Operation: INSPECT SPRAY PAINT QC14 14.0 **Comment:** Inspect Spray Paint 08 06 -03 Wrap in plastic bag to protect from scratches D31893 Chafing Shield 15.0 Comment: Qty.: 1.0000 Each(s) 1.0000 Each(s)/Unit Total: **Chafing Shield** *0*6 05 1656 Batch: D3595063450 RUBBER CUSHION 16.0 Comment: Qty.: 4.0000 Each(s)/Unit Total: 4.0000 Each(s) **Rubber Cushion** B618 08-06-03 Batch: 17.0 D28931 2.75 Support Comment: Qty.: 2.0000 Each(s) 2.0000 Each(s)/Unit Total: Pick: **Description Batch** Qty Part number 08 <del>-</del>06 -03 Support. 2 D2893-1 D2856600 Abrasion Strip 18.0 Comment: Qty.: Total: 0.9450 f(s) 0.9450 f(s)/Unit Abrasion Strip 1X D2856 .250" X 8.42" 35900 08 06 US Batch: MS2192024 Clamp(per MIL-DTL-8783C) 19.0 Total: 2.0000 Each(s) Comment: Qty.: 2.0000 Each(s)/Unit clamp(per MIL-DTL-8783C) 05 08 Ø batch: 10744 Clamp(per MIL-DTL-8783C) MS2192025 20.0 Comment: Qty.: Total: 4.0000 Each(s) 4.0000 Each(s)/Unit Clamp(per MIL-DTL-8783C) 107973 08-06-03 Batch:

Dart Aerospace Ltd
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W/O:		WORK ORDER C	HANGES				
DATE	STEP	PROCEDURE CHANGE	Ву	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector
•							
•							
Part No	•	PAR #· Fault Category:	NCR: Yes	No DO	١.	Date:	

QA: N/C Closed: \_\_\_\_

Date: \_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)								
		Description of NC	Corrective Action Section B			Verification	Approval	A		
DATE	STEP	Section A	Initial Chief Eng	Action Description Chief Eng	Sign & Date	Section C	Approval Chief Eng	Approval QC Inspecto		
						1				

Wednesday, 28/05/2008 9:58:06 AM Date: User: Julie Lecocq **Process Sheet** Drawing Name: 412 X-TUBE INST, LOW NARROW FWD Customer: CU-DAR001 Dart Helicopters Services Job Number: 39535 Part Number: D412664105 Job Number: Seq. #: **Machine Or Operation: Description: CROSSTUBES RESOURCE 1** 21.0 CROSSTUBES Comment: LANDING GEAR RESOURCE 1 Assemble as per Dwg D412-664-145 0806 05 1-Install Chaffing Sheild 2- Lightly scuff the bonded area using a 320 grit sand paper and clean the area with 41058 wash 'n' wipe ×T 08 06-03 3-Instal supports with magnobond 6398 per dwg D412-664-245, cure for 12hrs before packaging. Time & date of application: 2330 0806-03 Batch: INSPECT WORK TO CURRENT STEP 22.0 QC5 Comment: INSPECT WORK TO CURRENT STEP PACKAGING RESOURCE #1 PACKAGING 1 23.0 Comment: PACKAGING RESOURCE #1 Pick Packing Kit BOLT 24.0 AN635A Total: 4.0000 Each(s) Comment: Qty.: 4.0000 Each(s)/Unit Bolt Batch: Bolt 25.0 AN636A Comment: Qty.: 4.0000 Each(s)/Unit Total: 4.0000 Each(s) **Bolt** Ri Batch: Nut MS21042L6 26.0 Comment: Qty.: 6.0000 Each(s)/Unit Total: 6.0000 Each(s) Nut <u> Mloscit</u> Batch:

W/O:		WC	WORK ORDER CHANGES						
DATE	STEP	PROCEDURE CHAP	NGE By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector		
	3.7°								
		••••							
Part No	:	PAR #: Fault Categ	gory: NCR: Yes	No <b>DQ</b>	A:	Date:			

QA: N/C Closed: \_\_\_\_ Date:

	NCR: WORK ORDER NON-CONFORMANCE (NCR)							
	Description of NC		Corrective Action Section B			Ammrayal	A	
STEP	Section A	Initial Chief Eng	Action Description Chief Eng	Sign & Date	Section C	Chief Eng	Approval QC Inspector	
	STEP	STEP Description of NC Section A	Section A Initial	STEP Section A Initial Action Description	STEP Section A Initial Action Description Sign &	STEP Section A Initial Action Description Sign & Section C	STEP Section A Initial Action Description Sign & Verification Approval	

Wednesday, 28/05/2008 9:58:06 AM Date: User: Julie Lecoca **Process Sheet** Drawing Name: 412 X-TUBE INST,LOW NARROW FWD Custòmer: CU-DAR001 Dart Helicopters Services **Part Number:** D412664105 Job Number: 39535 Job Number: Description: Seq. #: **Machine Or Operation:** AN960JD616 Washer 27.0 Total: 18.0000 Each(s) Comment: Qty.: 18.0000 Each(s)/Unit Washer Batch: QC4 **INSPECT 100% KITS FOR COMPLETENESS** 28.0 KITS FOR COMPLETENESS PACKAGING RESOURCE #1 29.0 PACKAGING 1 Comment: HAND FINISHING RESOURCE #1 Identify and pack for shipping as per PPP D412-664-105 FINAL INSPECTION/W/O RELEASE 30.0 Comment: FINAL INSPECTION/W/O RELEASE Job Completion 

W/O: WORK ORDER CHANGES							
DATE	STEP	PROCEDURE CHANGE	Ву	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector
		-					
Part No	:	PAR #: Par #: NC	<b>R</b> : Yes	No DQA		_ Date:	

QA: N/C Closed: \_\_\_\_ Date: \_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)								
		Description of NC		Corrective Action Section B	Section B		Annroval	Approval		
DATE	STEP	Section A	Initial Chief Eng	Action Description Chief Eng	Sign & Date	Verification Section C	Approval Chief Eng	Approval QC Inspector		
				,						
						,				

DART AEROSPACE LTD	Work Order:	39535
Description: Crosstube Assembly (412 Low Narrow Fwd)	Part Number:	D412-664-145
Inspection Dwg: D412-664-145 Rev: C		Page 1 of 1

## FIRST ARTICLE INSPECTION CHECKLIST

X	First Article	Prototype
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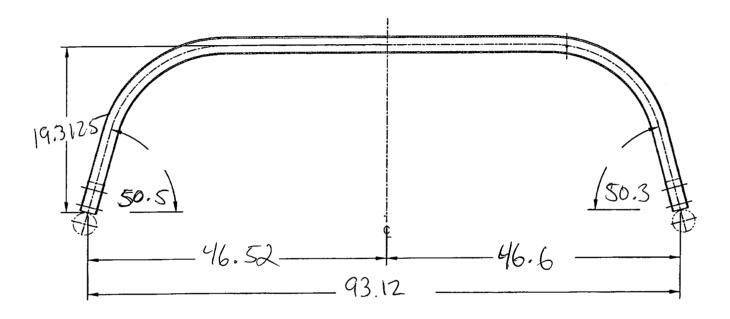
In	spection Sheet	Talanana	Actual	Accept	Poinst	Method of	Comments
Dra	wing Dimension	Tolerance	Dimension	Accept	Reject	Inspection	Comments
	2.740	+0.005/-0.000					
	2.490	+0.005/-0.000					
	2.557	+0.005/-0.000					
	2.624	+0.005/-0.000					
	2.692	+0.005/-0.000					
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	2.740	+0.005/-0.000					<del></del>
	2.490	+0.005/-0.000					
	2.557	+0.005/-0.000					
	2.624	+0.005/-0.000					
8	2.692	+0.005/-0.000					
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	124.48	+/-0.020					

Measured by:	Audited by:	Prototype Approval:	N/A
Date:	Date:	Date:	N/A

Rev	Date	Change		Revised,by	Approved
Α	08.04.21	New Issue	(P/O D412-664-105)	KJ/DD 🚓	

DART AEROSPACE LTD	Work Order:	39535
Description: Crosstube Low Narrow Fwd (412)	Part Number:	D412-664-105
Inspection Dwg: D412-664-145 Rev: C		Page 1 of 1

Required Dimension	Min	Max
Height	19.23	19.49
1/2 Span	46.47	46.73
Angle	49°	52°
Total Span	92.94	93.46



Con	nments
	$ \lambda$
QC15 Inspection Date	
Date	10805.28

Rev	Date	Change	Revised by	Approved
Α	07.04.27	New Issue	KJ/JM	ha
			7 ()	



DESIG	DESIGN P DRAWN BY		DART AEROSPACE LTD HAWKESBURY, ONTARIO, CANADA				
CHECK	(ED #	APPROVED A	DRAWING NO. REV. C				
	All	de	D412-664-145 SHEET 1 OF 3				
DATE			TITLE SCALE				
07.0	3.29		CROSSTUBE ASS'Y (412 LOW-N FWD) NTS				
 Α		06.12.21	NEW ISSUE				
В		07.03.01	CHG RUBBER CUSHION				
С		07.03.29	CHG CLAMP & RUBBER CUSHION LGTH.				

RELEASED

## **PARTS LIST:**

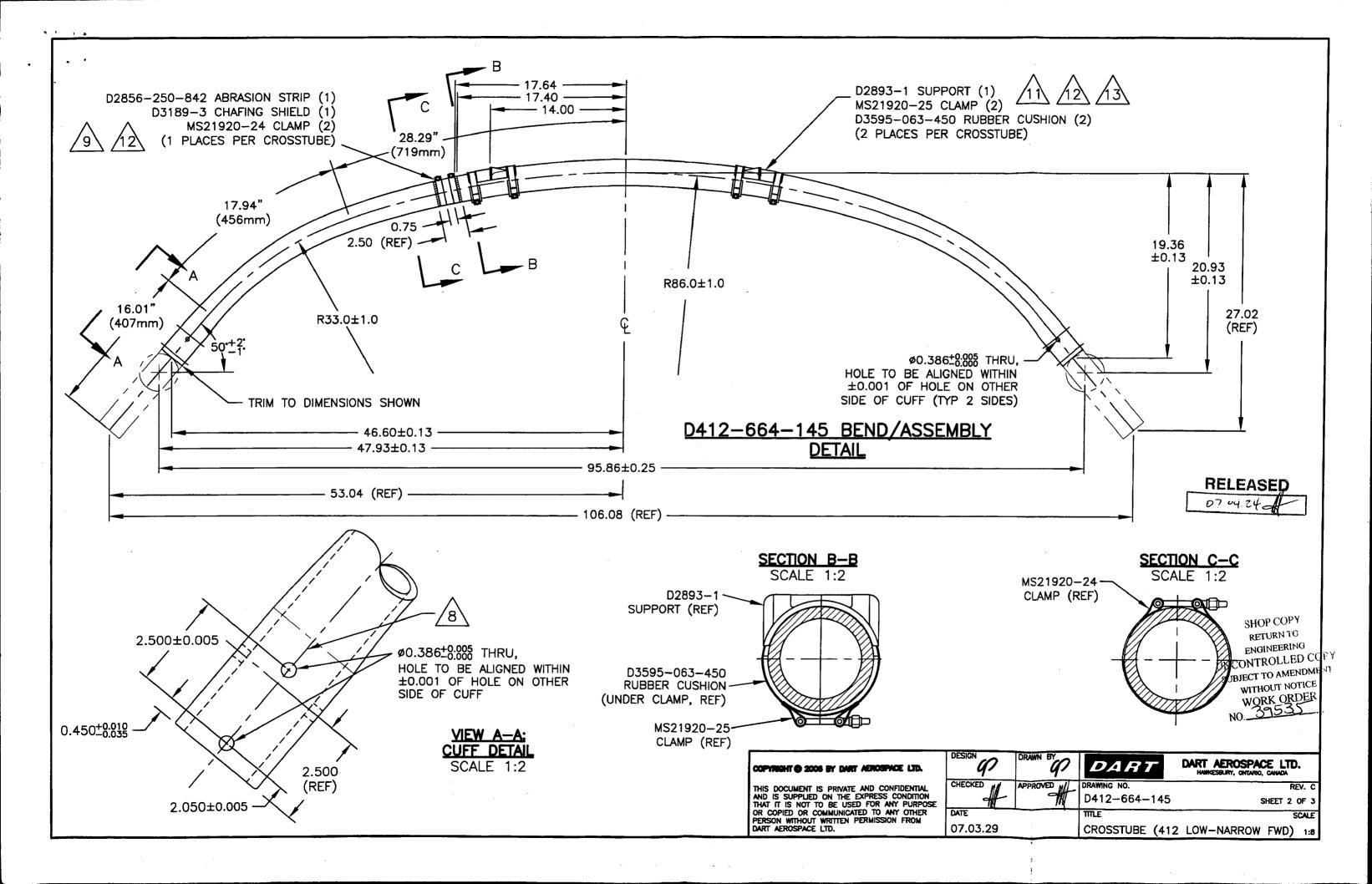
Qty	Part Number	Description
Х	D412-664-145	CROSSTUBE ASSEMBLY (412 LOW-NARROW FWD)
1	D6019-128	CROSSTUBE
1	D2856-250-842	ABRASION STRIP
2	D2893-1	SUPPORT
1	D3189-3	CHAFING SHIELD
4	D3595-063-450	RUBBER CUSHION
2	MS21920-24	CLAMP
4	MS21920-25	CLAMP (OR MS21920-26)
A/R	MAGNOBOND 6398	ROCKWELL SPECIFICATION RBO-120-023 ADHESIVE (TEXTRON/BELL SPEC. 299-947-100, TYPE II, CLASS 2 ADHESIVE)

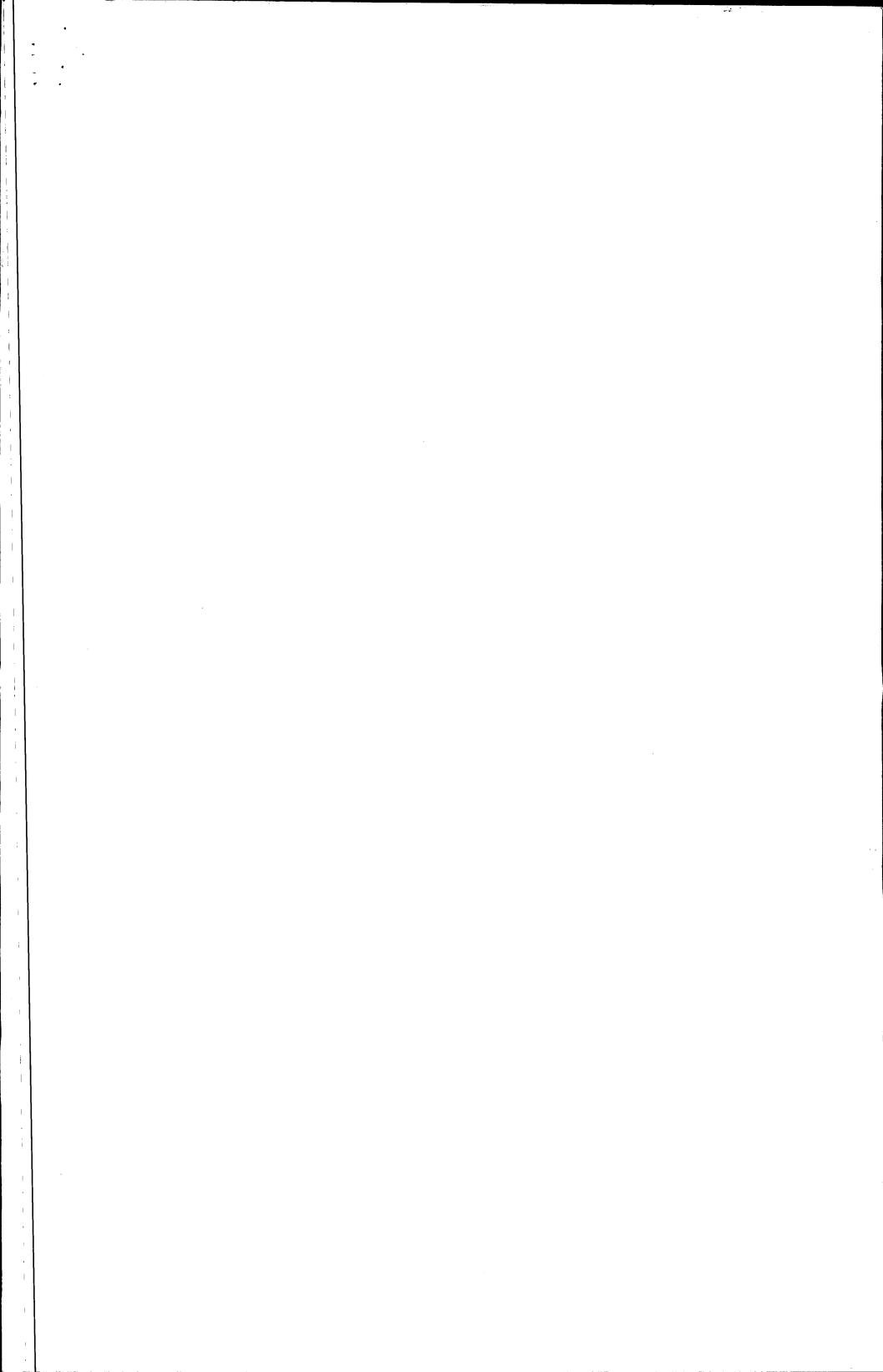
### **GENERAL NOTES:**

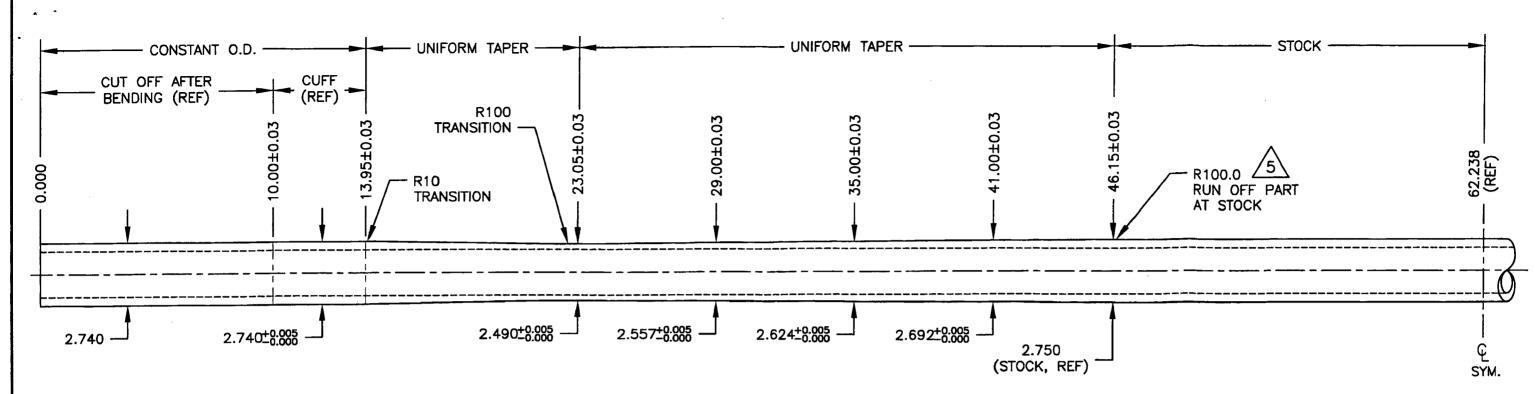
- TOLERANCES ARE PER DART QSI 018 UNLESS OTHERWISE NOTED.
- MATERIAL: MANUFACTURED FROM D6019-128

FINISHED LENGTH = 124.48±0.020 (BEFORE BENDING/TRIMMING)

- FINISH: CHEMICAL CONVERSION COAT PER DART QSI 005 4.1 PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2 PAINT OUTSIDE PER DART 005 4.2
- 4). PART IS SYMMETRIC ABOUT CENTERLINE, EXCEPT FOR D3189-3 CHAFING SHIELD AND ASSOCIATED HARDWARE.
- RUN-OFF PART. BLEND OUT EDGE LONGITUDINALY, TRANSITION SHOULD BE SMOOTH.
- BEND PROGRESSIVELY WITH A MINIMUM OF 8 PASSES. MAXIMUM TUBE FLATTENING DUE TO BENDING IS 6% BASED ON O.D.
- LIQUID PENETRANT INSPECT OUTSIDE SURFACE OF CROSSTUBE PER QSI 038.
- SCRIBE DART PART NUMBER AND BATCH NUMBER IN THIS AREA WITH VIBRATING STYLUS.
- INSTALL D2856-XXX-YYY ABRASION STRIPS WITH A 0.13 (REF) GAP ON BOTTOM SIDE OF CROSSTUBE PER QSI 035.
- 10) EXTREME CARE MUST BE TAKEN TO PROTECT THE OUTSIDE SURFACE OF THE TUBE. THE OUTSIDE SURFACE MUST BE SMOOTH AND FREE FROM SURFACE DEFECTS SUCH AS SHOP COPY SCRATCHES, NICKS, OR DENTS. DEFECTS UP TO 0.005" MAY BE BLENDED OUT RETURN TO LONGITUDINALLY. CIRCUMFERENTIAL GRIND MARKS ARE UNACCEPTABLE
- 11) APPLY A 0.03" TO 0.06" THICK LAYER OF MAGNOBOND 6398 TO THE SURFACE OF D2893 ANGINEERING THAT WILL BE IN CONTACT WITH THE CROSSTUBE. LET CURE FOR 12 HOURS AFTER CONTROLLED COPY INSTALLATION AND PRIOR TO PACKAGING.
- 12) INSTALL MS21920-25 CLAMPS (OR -26) WITH D3595-063-450 RUBBER CUSHIONS TO SECURE ORDER CROSSTUBE SUPPORT ON TOP SIDE OF THE CROSSTUBE. ENSURE CLAMPS ARE OPPOSITEWITHOUT NOTICE CROSSTUBE SUPPORT.
- 13) TORQUE CLAMPS 80 TO 100 IN-LB. ENSURE AT LEAST 1.5 THREADS SHOWING IN SAF, AND THAT NUT HAS NOT BOTTOMED-OUT AFTER TORQUING.

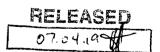


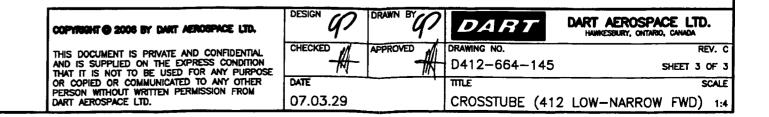


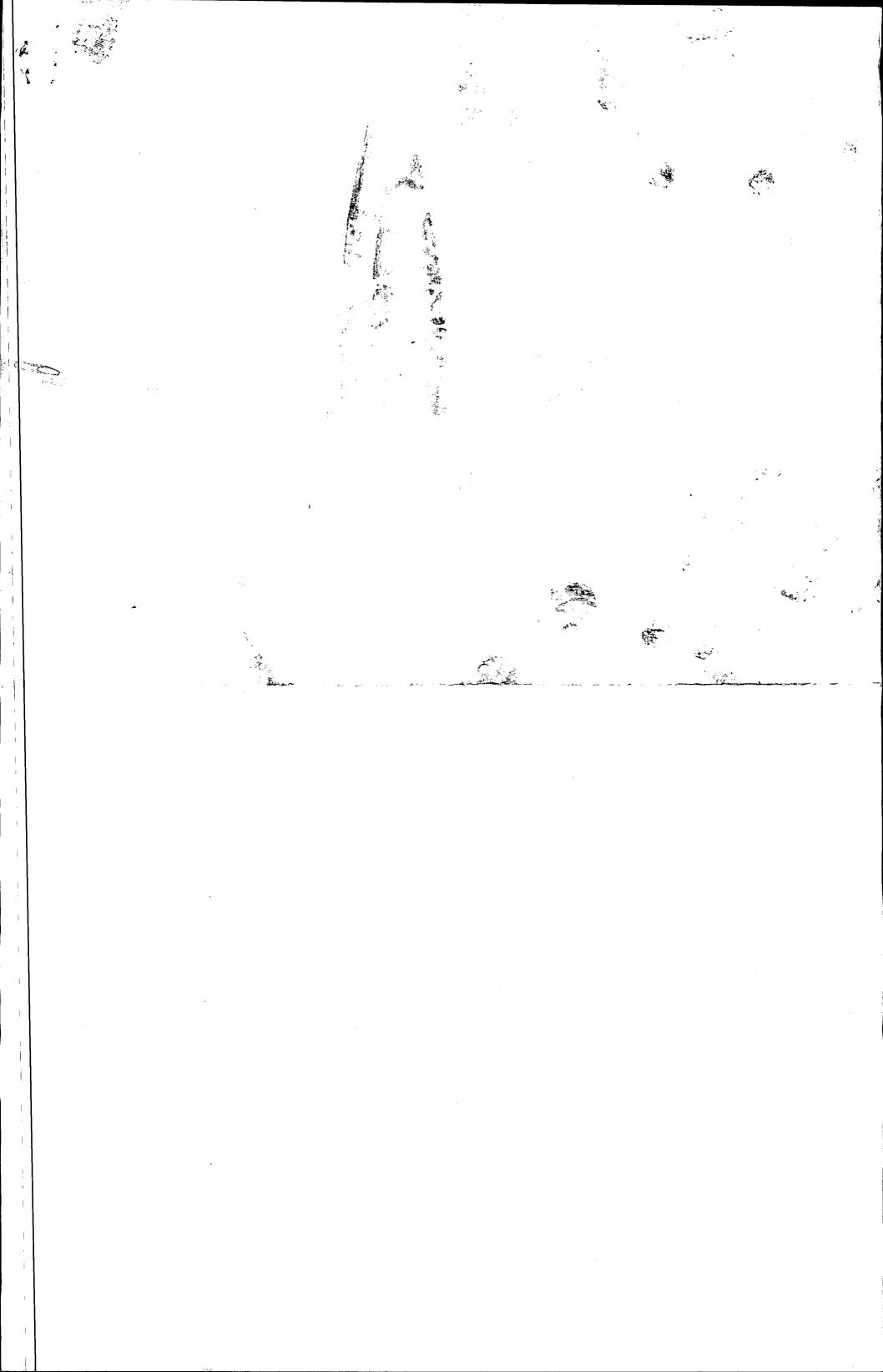


# D412-664-145 MACHINING DETAIL

SHOP COPY
RETURN TO
ENGINEERING
UNCONTROLLED COPY
SUBJECT TO AMENDMENT
WITHOUT NOTICE
WORK ORDER







#### P - 1311 1 LIQUID PENETRANT TEST REPORT OF 1 PAGE MAY 30, 2008 DART AEROSPACE PM D TIME AM D DATE CLIENT 188 08 1311 LINDA LACELLE ACUREN JOB NO. ATTENTION 1270 ABERDEEN ST 647 PO/WO No. ADDRESS HAWKESBURY HAWKESBURY, ONT. WORK LOCATION 2005 ASTM 1417/QSI-038 REV./DATE ACCEPTANCE STD. 412 HIGH AFT X TUBE, 212/205 HIGH AFT X TUBE, 412 LOW NARROW FWD X TUBE, PROJECT JOB#S 412-39111,39534,39535) 212/205-39367, 39368... ITEM(S) EXAMINED LT-TECH2 REV./DATE TECHNIQUE NO. JOB DESCRIPTION PROCEDURE NO. LT-0002 REV./DATE THICKNESS 'PART No. D412664203/D212664201/D412664105 MATERIAL ALODINED ALUM. WET FLOURESCENT LIQUID PENETRANT INSPECTION CARRIED OUT ON 100% EXTERNAL SURFACE SCOPE TEST DETAILS □ Post **EMULSIFIED** ☐ SOLVENT REMOVABLE WATER WASH METHOD **☑** FLUORESCENT ☐ VISIBLE ☐ AMBIENT < 2 fc □ ΟυΤΡυτ > 1000 μ W/cm² BLACK LGHT8171 FAMILY BRAND **MAGNAFLUX** LIGHTING EQUIP. FLASHLIGHT TROUBLELIGHT OUTPUT>100 fc @ SURFACE MINIMUM DWELL TIME MIN. PENETRANTZL67 45 CAL MAY 1 08 >10 OTHER PENETRANT REMOVER H20 MINIMUM DRY TIME MIN. CAL DUE DATE MINIMUM DWELL TIME 10 MIN. LIGHT METER S/N DEVELOPER SKDS2 **DEVELOPER TYPE** MON AQUEOUS ☐ AQUEOUS ☐ DRY **TEST SURFACE** CLEAN BARE METAL ☐ SHOT BLASTED As GROUND ☐ AS WELDED ☐ MACHINED SURFACE CONDITION ☐ -4°C/20°F TO 10°C/50°F ☐ 10°C/50°F TO 52°C/125°F ☐ > 52°C/125°F SURFACE TEMPERATURE □ <-4°C/20°F RESULTS-( METRIC MPERIAL) FLUORESCENT LIQUID PENETRANT INSPECTION CARRIED OUT ON 100% EXTERNAL SURFACE ON:

212/205 HIGH AFT X TUBE JOB#: 39367,39368.

412 HIGH AFT X TUBE JOB#: 39111.

412 LOW NARROW FWD X TUBE JOB#:39534(39535)



RESULTS: NO INDICATION OF DEFECTS.
ITEMS ACCEPTABLE TO STANDARD

Scope	ef	Services

The ogreement of Acuren Group Inc. to perform services extends only to those services provided for in writing. Under no circumstances shall such services extend beyond the performance of the requested services. It is expressly understood that all descriptions, comments and expressions of opinion reflect the opinions or observations of Acuren Group Inc. based on information and assumptions supplied by the owner operator and are not intended nor can they be construed as representations or warranties. Acuren Group Inc. is not assuming any responsibilities of the owner operator and the owner operator retains complete responsibility for the engineering, manufacture, repair and use decisions as a result of the data or other information provided by Acuren Group Inc. In no event shall Acuren Group Inc.'s liability in respect of the services referred to herein exceed the amount paid for such services.

Standard of Care

In performing the services provided, Acuren Group Inc. uses the degree, care and skill ordinarily exercised under similar circumstances by others performing such services in the same or similar locality. No other warranty, expressed o implied, is made or intended by Acuren Group Inc.

SIGNATURES		· · · · · · ·					
CLIENT REPRESENTATIVE	1.				DTR# E	19676	
TECHNICIAN (SIGNATURE):	4	w. PRINT		SIGNATURE	REPORT REVIEWED BY:		
NAME (PRINT):	JASON HEWETT					IAME	INITIALS
	CGSB LEVEL	2 SNT LEVEL 6156	CGSB LEVEL CGSB REG. NO	2 <sup>NO</sup> TECHNICIAN SNT LEVEL			

: 412 X-TUBE INST,LOW NARROW FWD

Qty:

1 Um:

Each

: D412664105

: 02/06/2008

: N/A

: C

: D412-664-145 REV C

Date: User: Wednesday, 28/05/2008 9:58:05 AM

Julie Lecoco

**Process Sheet** 

**Drawing Name** 

**Part Number** 

Material

**Due Date** 

**Drawing Number** 

**Project Number** 

**Drawing Revision** 

Customer

Prsht Rev.

First Issue

: CU-DAR001 Dart Helicopters Services

Job Number

: 39535

**Estimate Number** 

: 12816

P.O. Number

This Issue

: 28/05/2008

: NC

: //

Type

S.O. No. :

: CROSSTUBES

: 39534

Previous Run Written By

Checked & Approved By

Comment

: Est Rev:A New Issue 07-04-05 JLM

**Additional Product** 

Job Number:



Seq. #:

**Machine Or Operation:** 

Description: DOCUMENT CONTROL

1.0 DC



Comment: DOCUMENT CONTROL

Photocopy bluefile and create labels as per PPP D412-664-105 CHG001

2.0

PACKAGING RESOURCE #1



Comment: PACKAGING RESOURCE #1

3.0 D412664105TRN

CROSSTUBE TURNING DETAIL



Comment: Qty.:

1.0000 Each(s)/Unit

Total:

1.0000 Each(s)

CROSSTUBE TURNING DETAIL

batch

4.0

BENDING

BENDING MACHINE - SKIDTUBES



**Comment: BENDING MACHINE** 

Bend tube as per Dwg D412-664-145 using CNC bender program

5.0

QC6

DIMENSIONAL CHECK



Comment: DIMENSIONAL CHECK

6.0

CROSSTUBES

**CROSSTUBES RESOURCE 1** 



Comment: LANDING GEAR RESOURCE 1

1-Drill pilot holes in tube as per Dwg D412-664-245

2-Ream hole to finish size in tube as per Dwg D412-664-245





C.....

